A NEW HUMAN SKULL OF A LOW TYPE FROM BRAZIL.[1]

A LOW type of human skull has recently been described by Prof. A. Nehring, which was found near Santos, in Brazil. It occurred in a breccia ("sambaqui"), the exact age of which is uncertain, associated with fish vertebræ, a portion of the lower jaw of a toothed-whale, and a few fragments of other human remains and implements.

The principal measurements given are the maximum length (183 mm.), maximum breadth (135 mm.), minimum frontal (88 mm.), maximum frontal (92 mm.), frontal sagittal arc (118 mm.), and the parietal arc (134 mm.) The cephalic index is thus 77·6. Virchow has also described two skulls from a sambaqui near Santos, with indices of 82 and 79·8; while de Lacerda measured three male skulls from sambaquis in Parana and Santa-Catherina, with the indices of 67, 68·8, 77·2, and two female skulls with 79·7 and 81·4. There is thus great variation among these people, which Nehring regards as individual or partly sexual, and not due to ethnical mixture.

The forehead is low and retreating, the glabella and orbital ridges well developed, and the frontal is greatly constricted behind the orbital region, as in Pithecanthropus. This constriction is also very characteristic of ancient and recent South American skulls (Peixoto and de Lacerda), some of which are absolutely and relatively not broader than Pithecanthropus.

Dr. Nehring, from his studies on the skulls of both sexes and various ages of anthropoid apes and of dogs of different breeds, is of the opinion that the occurrence of a constriction between the orbital and cerebral portions of the skull has direct relation to the strength of the head musculature, and more especially of the jaw muscles. If the skull of a muscular Eskimo dog be compared with that of a pug or a Bolognese lap-dog, it will be found that this constriction is very marked in the Eskimo dog, the zygomatic arches of which are widely outstanding, and all the muscular attachments strongly developed; but the constriction is scarcely noticeable in the pug, and is entirely wanting in the Bolognese lap dog; the two latter exhibit feminine rounded forms of the corresponding parts of the skull, with a feebly developed musculature.

The author compares human skulls with those of middle-aged female chimpanzees and gibbons, and finds a great similarity in the constriction of their respective frontal bones. He justifies this comparison by pointing out that the human skull always remains in a juvenile stage, while that of the ape, especially the male, is strongly modified by the jaw and neck muscles. The human condition is accounted for by the erect position, with the consequent balancing of the skull on the vertebral column, and the reduction in the dentition owing to the artificial preparation of food. According to Nehring, the constriction of the orbital portion from the cerebral portion of the skull of Pithecanthropus does not prove a simian origin.

The face of the sambaqui cranium is strongly prognathous; perhaps this is increased by an abnormality in the arrangement of the teeth, there being seven upper incisors, of which two are placed behind the others, and the third is in the middle of the normal series and has a curious curve on its anterior aspect. Only one of the normal teeth is slightly displaced. Nehring does not regard these as persistent milk-teeth, but as supernumerary teeth.

The whole dentition is strong, in fact it is one of the most powerful of known human dentitions, and the two molar series are parallel to each other, and are not in the form of a horse-shoe. All the teeth are perfectly sound.

The dimensions of the pre-molars and molars come very close to those of Spy No. 1 skull, any difference there may be being in the direction of the dentition of Spy No. 2; thus we find that the exceptional size of the wisdom-teeth in the Spy skulls is also characteristic of the sambaqui cranium.

While the length-breadth dimensions of the new skull agree fairly closely with those of Pithecanthropus, the cranial height is considerably higher, and consequently the capacity, if it could be measured, would be much greater. Looked at from above, the skull is better filled than that of Pithecanthropus, both posteriorly and in the anterior temporal region; there is also a marked difference between the orbital portion of the frontal bone, which somewhat resembles that of the Neanderthal calvaria, and the flat projecting character of that region in Pithecanthropus erectus.

A. C. Haddon.

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[1] Prof. A. Nehring: "Menschenreste aus einem Sambaqui von Santos in Brasilien, unter Vergleichung der Fossilreste des Pithecanthropus erectus Dubois." *Verhandl. Berliner anth. Gesellsch.*, 1895-6, p. 710.

THE SURFACE-DIMENSIONS OF AN EARTHQUAKE-PULSATION.

IT is now well known that the effects of a great earthquake are not confined to the more less limited area over which it is perceptible to human beings, or capable of disturbing seismographs. With suitable instruments, the oscillations may be traced for thousands of miles, and there is no reason whatever for doubting that in the future they may be traced (possibly several times) completely round the globe. As to the exact nature of the pulsations, we are still in partial ignorance; but part of the movement certainly consists of a real tilting of the surface of the ground. Prof. Milne regards earth-pulsations as long, low waves, somewhat resembling an ocean-swell; and the object of this short note is to show that, in one case at any rate, his view is correct.

On April 27, 1894, a severe earthquake occurred in North-east Greece, and the pulsations were observed in Birmingham with one of Mr. Darwin's bifilar pendulums (Nature, vol. l. pp. 7, 246–9). The average period of the pulsations was fourteen seconds, and the maximum change of inclination of the ground in the east and west direction was not less than one-quarter of a second. A comparison of the times at Athens, Birmingham, and other places, shows that the velocity of the first large pulsations was nearly constant, and equal to 3·21 km. per second.

Assuming the form of a right section of the pulsation to be a simple harmonic, the length of a complete pulsation is vt km. where v is the velocity in km. per second, and t seconds the duration of its period. The amplitude of the pulsation, *i.e.* the height of its crest above the position of equilibrium, is easily shown to be $\alpha vt/6^4$ metres, where α seconds is the maximum tilt of the ground with reference to a horizontal plane. In the case of the Greek earthquake, we have $t = 14$, $v = 3{\cdot}21$ and α not less than $\frac{1}{8}$. These figures show that at Birmingham the length of a pulsation must have been 45 km., and the height not less than 4·4 mm.

The estimate of the height is not great enough for two reasons: (1) owing to its suspension in oil, the mirror of the pendulum was unable to perform its full swing during the brief period of the pulsation; and (2) the pendulum showed only the component of the tilt in the east-west plane. When the frame of the pendulum is suddenly tilted through an angle of 2″, the deflection of the mirror at the end of a quarter of a minute is only half the correct amount. If, therefore, we multiply the above result for the height by 3, we shall probably be not far from the true value.

Thus, translated into ordinary units, the largest pulsations of the Greek earthquake at Birmingham must have been about 28 miles long and half an inch in height.

Charles Davison.

SCIENCE IN THE MAGAZINES.

WITH an article on "The Evolution of the Professions," Mr. Herbert Spencer concludes the series of papers on professional institutions which he has been contributing to the *Contemporary* for some months. The fact which the whole of the papers have aimed at showing, and which is illustrated by the present article, is that society is a growth, and not a manufacture, and has its laws of evolution. "From Prime Ministers down to ploughboys," we read, "there is either ignorance or disregard of the truth that nations acquire their vital structures by natural processes and not by artificial devices. If the belief is not that social arrangements have been divinely ordered thus or thus, then it is that they have been made thus or thus by kings, or if not by kings then by parliaments. That they have come about by small accumulated changes not contemplated by rulers is an open secret which only of late has been recognised by a few and is still unperceived by the many—educated as well as uneducated." In support of this law of the evolution of society, Mr. Spencer cites numerous instances drawn from agriculture, manufactures, commerce, and various professional institutions where advancement has been achieved by spontaneous co-operation of citizens, and not by legislative direction. We have "knowledge developing into science, which has become so vast in mass that no man can grasp a tithe of it, and which now guides productive activities at large, has resulted from the workings of individuals prompted not by the ruling agency but by their own inclinations." So, and in like manner, it is held that the unprompted workings of humanity, and not time-serving legislation, are responsible for real social progress.

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Prof. James Sully contributes an amusing article to the *National Review*, on "The Humorous Aspect of Childhood." Some of the stories he tells in illustration of the simplicity and openness of child-nature deserve repetition here. The little boy who, in describing a fat lady, said she was just like a seal, used a singularly appropriate simile; for the human figure bereft by its obesity of the neck and waist divisions does grow seal-like. Then the purely arbitrary character of many of our language-forms affords opportunities for such remarks as that of the small boy who spoke of Charles the First's body having been cut off from his head. Another example of this childish tendency to rearrange things is supplied by the remark of a boy of five, who being asked whether the baby was christened, answered with alacrity, "No, she isn't christened, but she's vaccinated." Children are entirely anthropomorphic, believing that things about them have some mysterious relation to them. This is exemplified by the story of a child who quaintly remarked to an older child that seemed frightened on hearing about earthquakes, "They don't have earthquakes in little towns like this." Prof. Sully remarks on this: "The words suggest that the little comforter conceived of the earthquake as something which was specially designed for human spectators, to throw them into cold shudders, or possibly to electrify them with the delicious excitement of danger, according to their temperaments, and which would not therefore be brought on the scene where there was not a full house, so to speak. The saying seems to me full of the characteristic quaintness of child-thought. It is so deliciously comical to us who know, or fancy we know, what these alarming oscillations of the earth's surface really are, to have them thus turned by the naive conceit of the child-mind into a kind of show. Yet may we not here too detect an exaggeration of something in older people's thought about the universe, and in smiling at the crudity of the child's whimsical fancy be half-quizzing our own occasional lapses from the perfectly detached and unimpassioned point of view of science?" All who are interested in child-thought and child-observation should read Prof. Sully's collection of stories. The pity of it is that our educational system should so effectually crush the faculties of quick and acute observation and logical reasoning possessed by children.

Prof. John Trowbridge describes experiments with Röntgen rays in *Scribner's Magazine*, under the title "The New Photography by Cathode Rays." He refers to the new actinic rays as "cathode rays" throughout his article. An interesting illustration accompanying his article is a double picture of the Röntgen shadow of a turkey's wing, taken by rays from two cathodes slightly separated from one another. By measuring the distance between the double images, the depth of the shot can be estimated by triangulation.

Among the articles of minor scientific interest, we notice one on the boundary dispute between Great Britain and Venezuela in the *National*, by the editor, Mr. L. J. Maxse. This is accompanied by two maps from the recent Venezuela Blue-book. In *Longman's*, Mr. Fred Whishaw has a sympathetic paper on life in a pine-forest in winter. *Chambers's Journal* has its usual complement of information articles, the most noteworthy being on "Toad-Lore," "Modern Gunpowder and its Development," "Pets and Pests in Barbadoes," and "Bird-Catching in Heligoland." The *Humanitarian* has two papers on "University Degrees for Women," in one of which Dr. A. W. Verrall states the case for degrees, while Mrs. B. J. Johnson writes for the opposition. In the *Strand Magazine* is an instructive account of "Diamond Mining in South Africa," by Mr. J. Bucknall Smith. Finally, scientific phonographers will find much to interest them in the clearly-printed pages of the *Phonographic Quarterly Review*.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

The Education Bill of Sir John Gorst, to which reference has already been made in these columns, makes, it is true, several provisions for secondary education, but it can hardly be supposed that the comparatively few recommendations under this heading are to be the only outcome of the prodigious labours of the recent Commission. The county education authority, the constitution of which was explained in a note last week, may, amongst other matters, aid any school in the provision of secondary education, or, with the consent of the Education Department, may take a transfer of any secondary school. It may also establish such schools; found and maintain scholarships or exhibitions; supply, or aid in supplying, teachers; make inquiries with respect to the sanitary condition of the school-buildings (including boarding-houses) of any school within their county; and make inquiries with respect to the education given by any school within their county. Schools which in the opinion of the Education Department are of a non-local character are, however, excepted. The education authority may then take such measures as they think fit for giving information to the public with respect to the result of such inquiries. The county education authority is to be given power to *aid* any establishment or organisation for the training of teachers, but there seems to be no provision for the formation of new training schools or colleges. Provision is made for the transfer of higher grade board schools to the county authority, either at their own request or that of the School Board concerned. If the education authority desire, they may make it one of the conditions of any grant to a secondary school that representatives of the authority be added to the trustees or governing body of the school. The consent of the trustees being given, such representatives will become for all purposes members of the governing body of the school. It is further arranged that the amount which can be raised under the Technical Instruction Act, 1889, shall not be exceeded. One satisfactory point is that, in the event of this Bill becoming law, it will be impossible to have any further diversion of the money available under the Local Taxation Act, 1890, to purposes other than those of education. These funds are, moreover, to be in the future available for all degrees and kinds of secondary education, and not only for technical instruction.

At the meeting of the Manchester City Council, held on Wednesday, April 1, Mr. Alderman Hoy reported that the Co-ordination Sub-committee of the Technical Instruction Committee had been dissolved. This Sub-committee was composed of representatives of the principal educational institutions in that city, and has been successful in arranging for the better co-ordination of the spheres of work of these institutions, and has so prevented over-lapping. It has been successful in bringing the School Board into line with the work of the Committee specially concerned with technical education, and has done very valuable work in other ways. We hope to see other large towns following the example thus successfully set by Manchester, for it is certain that by friendly conferences of this sort the best results for education will be obtained. It has been decided to appoint an Advisory Committee in the place of that dissolved, which will comprise the Chairman of the Technical Instruction Committee (Mr. Alderman Hoy), the Chairman of the School Board, the Principal of Owens College, and the High Master of the Grammar School. This Sub-committee will have power to call together the General Committee whenever they deem it necessary in view of any educational emergency.

SCIENTIFIC SERIALS.

Bulletin of the American Mathematical Society, vol. ii. No. 6, March 1896.—"The three great problems of antiquity considered in the light of modern mathematical research" is a review, by Miss C. A. Scott, of Prof. Klein's Festschrift for the third meeting of the Association for the Advancement of Mathematical and Scientific Teaching in the Gymnasia, entitled "Vorträge über ausgewählte Fragen der Elementargeometrie." Of course the problems intended are the duplication of the cube, the trisection of an angle, and the quadrature of the circle. The pamphlet is divided into two parts: the first deals with algebraic numbers, the second with transcendental numbers. The analysis is very full, so that the reader gets a thoroughly good idea of Prof. Klein's work. "But while reading this brilliant exposition it is difficult to avoid cherishing a lurking regret, which is possibly very ungracious, that Klein could not himself spare time to arrange his work for publication; for though we have here in full measure the incisive thought and cultured penetration which together make even strict logic seem intuitive, yet at times we miss the minute finish and careful proportion of parts that we feel justified in expecting from him. And yet revision and consolidation might have seriously interfered with the graphic simplicity of these chapters, and left them less adapted to their special purpose." From Miss Scott's account we are thoroughly disposed to endorse her wish that the

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